structure, formation and growth of the coral reefs of the Indian Ocean. Special attention was given to the island of Minikoi, in the Laccadive group. It was clear from their observations that in this atoll there had been an elevation of the original reefs to a height of at least 25 feet above low tide level. All their evidence showed that the lagoons of atolls were generally formed by the solution of the central rock of originally more or less flat reefs.

Prof. R. Burckhardt followed with a paper on the anatomy and systematic position of the Læmargidæ. He recorded the discovery of luminous organs in nine species of Læmargidæ and Spinacidæ. The affinity of these families of sharks was further evidenced by his discovery of a cartilage hook in the dorsal fins of *Laemargus*.

Prof. Burckhardt also showed photographs and other illustrations of the nestling kagu (*Rhinochetus*), a rare flightless bird of New Caledonia.

Prof. R. J. Anderson described the dentition of the seal; and Mr. Graham Kerr, on behalf of Mr. G. E. H. Barrett-Hamilton, exhibited some skulls of Antarctic seals (chiefly Phocidæ) brought home by the Belgian expedition.

On Tuesday, Mr. N. Annandale exhibited a number of photographic slides illustrating the appearance and habits of some Malay insects under natural conditions. One striking series represented the pupa of a Mantis (*Hymenopus bicornis*) seated on an inflorescence of the so-called "Straits Rhododendron" (*Melastoma polyanthum*), a detailed resemblance to which is brought about by the colour and shape of the insect, and by the extraordinary attitude which it adopts upon the flower.

Prof. E. B. Poulton also showed a large number of slides, representing the collections of insects made by Mr. G. A. K. Marshall in Mashonaland and Mr. R. Shelford in Borneo, as arranged in the Oxford Museum to illustrate the general principles of Müllerian mimicry. An interesting series of mutilated butterflies caught at large showed the comparative rarity of indiscriminate injuries by birds, and the frequency with which enemies aimed at the conspicuously marked tips of the fore-wings and at the back of the hind-wings, where tail-like processes were so commonly developed, these being just the places where the bites would be least dangerous to the insects.

Other slides, illustrating mimicry and protective resemblance, were exhibited by Mr. Mark L. Sykes; and Prof. Lloyd Morgan described some recent experiments upon newly-hatched chicks, which showed that the avoidance of distasteful forms by birds is not instinctive, but the fruit of experience. Chicks fed for a time on palatable food placed on black-and-orange banded slips of glass did not hesitate to attack the distasteful caterpillars of the cinnabar moth when these were eventually offered them; whereas chicks which had been accustomed to associate the same coloured slips with bad food refused to attack the similarly striped caterpillars. These observations provided a sound experimental basis for the Müllerian theory of mimicry.

Mr. F. W. Gamble described the results of investigations made by Mr. F. W. Keeble and himself on the colour changes of various prawns, especially *Hippolyte varians*, his paper being illustrated by a series of living specimens as well as by lantern slides. The prawns adapted their colours to those of surrounding weeds; but, whatever their colour during the day, they always assumed a characteristic blue colour at night. This change, in newly-caught specimens, came on at the proper time quite independently of the darkness, and the morning phase would be resumed at daybreak, even when the animal was kept in the dark. After a few days under such unnatural conditions, however, the periodicity became altered.

A paper, by Dr. Æneas Munro, on the locust plague and its suppression concluded the business of the section.

GEOGRAPHY AT THE BRITISH ASSOCIATION.

THE work in Section E at the Bradford meeting was somewhat limited in amount, but its quality was in no way below the average. In fact, the number of "popular" papers was smaller than usual, while those of a more serious character predominated. The section was excellently housed in the Church Institute, and the meeting began with a presidential address of quite a novel character. Sir George Robertson took the British Empire as his text, and laid great stress on the relative shrinkage of distances by the improvement of means of communication by land and sea, a fact which in great measure neutralised such ill effects as might arise from continuous expansion of territory.

The keynote struck by the president was geography as the science of distances, and in unison with it a series of papers dealt with problems of which distances and means of transport were the essential features. Mr. E. G. Ravenstein discussed the question of foreign and colonial surveys in a comprehensive paper, in which he pointed out the manner and extent of the official surveys of the chief countries of the world. While recognising that the British Ordnance Survey fell short of perfection, he considered that its accuracy was not equalled by the maps of any other country. He strongly urged the adoption of a more systematic method of surveying in Africa, in many parts of which the only existing maps were produced by travellers with inadequate assistance and many other things to do. In commenting on the paper, Colonel Johnston, the Director-General of the Ordnance Survey, explained the position of South Africa with regard to its surveys. He said that a nearly perfect system of triangulation had been carried out, but this has not yet been utilised by being made the foundation of a detailed survey.

Mr. B. V. Darbishire read a paper on military maps, with special reference to the use of the Ordnance Survey Maps in field manœuvres.

Colonel Sir Thomas H. Holdich discussed the question of a railway connection between Europe and India. He considered the northern approaches to India across Kashmir or the Hindu Kush from the Oxus valley to be impracticable. On the other hand there appeared to be no insurmountable difficulty in the way of a connection by the Hari-rud valley, through which approach a distance of only 500 miles intervened between the farthest outposts of the existing railways, Kushk on the Russian side and New Chaman on the Indian. The new line would pass by Kandahar. This line could, in the opinion of the author, be made to pay by local traffic, and he believed it would strengthen rather than weaken the defences of India.

Mr. C. Raymond Beazley read a paper, which was largely historical and statistical, on the Trans-Siberian railway.

Mr. G. G. Chisholm gave a very timely forecast of the probable economic changes which may be expected to result from the imminent development of the resources of China by modern methods. These would include, in his opinion:—A rise in prices in China, especially in the industrial regions; a demand for food-stuffs not likely to be supplied by China itself; a great stimulus to the food-producing regions most favourably situated for meeting this demand, more particularly Manchuria, Siberia, and western North America; and the creation of a tendency to a gradual but prolonged rise in wheat and other grain prices all the world over, reversing the process that has been going on since about 1870.

Mr. Edward Heawood treated of the commercial resources of tropical Africa, and his paper also partook of the spirit of forecast, his expectations being that Africa will greatly increase in importance by the cultivation of tropical plantations.

The travel papers which excited the most interest were those contributed by Mr. Borchgrevink on his expedition to the Antarctic regions and by Captain H. H. P. Deasy on his journeys in Central Asia. Both were illustrated by remarkably fine lantern slides. As the facts which they recounted have already been published, it is unnecessary to summarise them here.

Physical geography occupied a large part of the time of the section, and, with regard to this part of the work, it is impossible to refrain from expressing the desire that some arrangement might be come to with regard to the section in which papers lying on the borderland between different subjects should be treated. With regard to meteorology, for instance, might it not be arranged to read all climatological papers—the essential principle of which is geographical distribution—at Section E, and only the theoretical papers or those dealing with instruments and atmospheric physics at Section A?

On this occasion the report of the committee on the climate of tropical Africa, of which Mr. H. N. Dickson is secretary, was read to Section E, and a remarkable discussion of the geographical distributions of relative humidity was presented by Mr. E. G. Ravenstein to the same section. In this he said that, notwithstanding the paucity of available material, he had ventured, in 1894, to publish in Philip's "Systematic Atlas," a small chart of the world showing the distribution of humidity, and he now placed the results before this meeting with some diffidence. His charts brought out the broad features of the subject, and to reduce the sources of error

he had limited himself to indicating four grades of mean annual humidity, the upper limits of which were respectively 50 per cent. (very dry), 65 per cent., 80 per cent., and 100 per cent., (very damp). The relative humidity over the oceans might exceed 80 per cent., but in certain regions ("horse latitudes") it was certainly much less, and in a portion of the Southern Pacific it seemed not to exceed 65 per cent. One chart exhibited the Annual Range of Humidity, viz. the difference between the driest and the dampest months of the year. In Britain, as in many other parts of the world, where the moderating influence of the ocean was allowed free scope, this difference did not exceed 16 per cent., but in the interior of the continents it occasionally exceeded 45 per cent., spring or summer being exceedingly dry, whilst the winter was excessively damp, as at Yarkand, where a humidity of 30 per cent. in May contrasted strikingly with a humidity of 84 per cent. in December. This great range directed attention to the influence of temperature (and of altitude) upon the amount of relative humidity, for during temperate weather we were able to bear a great humidity with equanimity, whilst the same degree of humidity, accompanied by great heat, may prove disastrous to men and beasts. Hence, combining humidity and temperature, the author suggested mapping out the Earth according to sixteen *hygrothermal types*, as follows:—(1) Hot (temperature 73° and over) and very damp (humidity 81 per cent. or more): Batavia, Camaroons, Mombasa. (2) Hot and moderately damp (66–80 per cent.): Havana, Calcutta. (3) Hot and dry (51–65 per cent.): Bagdad, Lahore, Khartum. (4) Hot and very dry (50 per cent. or less): Disa, Wadi Halfa, Kuka. (5) Warm (temperature 58° to 72°) and very damp: Walvisch Bay, Arica. (6) Warm and moderately damp: Lisbon, Rome, Damascus, Tokyo, New Orleans. (7) Warm and dry: Cairo, Algiers, Kimberley. (8) Warm and very dry: Mexico, Teheran. (9) Cool (temperature 33° to 57°) and very damp: Greenwich, Cochabambo. (10) Cool and moderately damp: Vienna, Melbourne, Toronto, Chicago. (11) Cool and dry: Tashkent, Simla, Cheyenne. (12) Cool and very dry: Yarkand, Denver. (13) Cold (temperature 32° or less) and very damp: Ben Nevis, Sagastyr, Godthaab. (14) Cold and moderately damp: Tomsk, Pike's Peak, Polaris House. (15) Cold and dry. (16) Cold and very dry: Pamirs.

The actual mean temperature of the Earth amounted, according to his computation, to 57° F., and this isotherm, which separated types 8 and 9, also divided De Candolle's "Mikrothermes" from the plants requiring a greater amount of warmth.

Mr. Vaughan Cornish described his recent observations on snow ripples with beautiful photographic illustrations, and Prof. J. Milne gave an account of the large earthquakes recorded in 1899. Mr. R. T. Günther described the peculiar character of the coast of the Phlegræan Fields near Naples, and showed that by observations of the numerous submerged buildings of that district it might be possible to determine the date and duration of the fluctuations of the land and sea level during the last twenty centuries. The Association subsequently voted a money grant to assist him in carrying out the researches which he had suggested.

Dr. H. R. Mill exhibited and described the new insulating water-bottle designed by Profs. Pettersson and Nansen, and made by Messrs. Ericsson, for obtaining water-samples from any desired depth and bringing them up without change of temperature. The new apparatus was tested by Prof. Nansen last August on board the *Michael Sars* in the North Atlantic, and found to be completely satisfactory.

Dr. Mill also read a paper on the treatment of regional geography, in which he laid down the general principle that the fixed conditions of the land surface had first to be described, and then the mobile distributions, which were modified by the fixed forms. As an example, he dwelt at some length on the configuration of a section of the South Downs and the effect of this configuration in determining the distribution of rainfall in the district, a problem which he hoped to treat in greater detail at a future date.

Mr. J. E. Marr described the typical land form known as a moel, with special reference to the forms it assumed when dissected by sub-aërial erosion.

Two educational papers of much interest were read. One by Mr. T. G. Rooper dealt with the progress made in teaching of geography in the elementary schools of the West Riding since 1883. He illustrated it by the exhibition of a series of remarkable relief models on different scales produced by school teachers and used by them in their regular work. Some of these were of typical features, such as the Red Tarn, to typify a mountain lake, others of the actual school district taken from the Ordnance map, and others, on a small scale, of large parts of the country. The second paper was by Mr. E. R. Wethey, who gave a demonstration of his method of teaching commercial geography by the use of lantern maps, diagrams and pictures, a large number of which, in novel and striking forms, he showed upon the screen.

Educational questions have always occupied a considerable share of the time of Section E, and the committee very cordially supported the proposal to recommend the Council of the Association to form a new Section for the discussion of education in a more complete and technical manner than could be secured in a gathering of votaries of one isolated branch of science.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—Mr. E. S. Goodrich has been elected to a fellowship in natural science at Merton College.

CAMBRIDGE.—In his annual address to the Senate at the opening of the term, the Vice-Chancellor announced that the Benefactor Fund amounted to 55,000*l.*, and that the Squire Trustees had agreed to contribute 15,000*l.* towards the erection of the Law School. The plans for the Botanical and Medical Departments have been approved, and building will shortly commence; but fresh benefactions are still needed to meet the urgent demands for further accommodation.

The new Department of Agriculture, under the able guidance of Prof. Somerville, is now well started. The funds at its disposal have enabled it to secure an efficient staff, and it is provided with an excellent experimental farm. The University has sought to encourage the study by establishing a special amination in agricultural science for the B.A. degree.

Dr. L. Humphry has been appointed assessor to the Regius Professor of Physic; Sir G. G. Stokes and Prof. Darwin electors to the Isaac Newton Studentship in Physical Astronomy; and Dr. Tatham an examiner for the diploma in Public Health. Mr. Leathem (St. John's) and Mr. Grace (Peterhouse) have been appointed moderators, and Mr. Whitehead (Trinity) an examiner, for the Mathematical Tripos.

Rooms for work in clinical pathology, bacteriology, &c., have just been erected by the staff and presented as a gift to Addenbrooke's Hospital. They will be open for work, under the direction of Prof. Sims Woodhead, during the present term.

At Emmanuel College a research studentship of 100*l.* has been awarded to Mr. J. Mellanby. Grants have been made from the studentship fund of 60*l.* to Mr. G. F. Abbott, and of 40*l.* to Mr. D. G. Hall. At Queen's College the Rev. C. H. W. Johns has been elected to the office of lecturer in Assyriology.

MR. C. R. P. ANDREWS, of St. John's Training College, Battersea, has been appointed first principal of the new Government training college to be opened at Perth, Western Australia.

DR. SAMSON GEMMELL, of Anderson's College, Glasgow, has been appointed professor of clinical medicine in the University of Glasgow, in succession to Prof. McCall Anderson.

DR. CULLIS, professor of mathematics at the Hartley College, Southampton, has been appointed professor of mathematics at the Presidency College, Calcutta.

MR. J. F. HUDSON, late lecturer in mathematics at Jesus College, Oxford, has been appointed professor of mathematics at the Hartley College, Southampton.

MR. J. STUART THOMSON, formerly demonstrator of zoology at the School of Medicine of the Royal Colleges, Edinburgh, has been appointed lecturer in botany and zoology at the Municipal Science, Art and Technical Schools, Plymouth.

THE School of Engineering of Columbia University, New York, announces a new course of study dealing with the construction of automobiles, self-propelling road engines and railway cars.

PROF. GOSS has been made dean of the Engineering Schools of Purdue University, Lafayette, Ind., and Prof. L. C. Glen, of South Carolina College, has been appointed to the chair of geology in Vanderbilt University.

MR. PERCY H. FOULKES has been elected first principal of the Harper Adams College, Newport, Salop. He will enter